

# PATENT SPECIFICATION

DRAWINGS ATTACHED

1,125,870



1,125,870

Date of Application and filing Complete

Specification: 23 August, 1967.

No. 38778/67

Complete Specification Published: 5 September, 1968.

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Index at Acceptance:—E1 G (96B, 96J, 96L).

Int. Cl.:—E 02 d 29/14.

## COMPLETE SPECIFICATION

### Manhole cover and mounting frame assembly

WE. PETER JOHN JAMES WOODROW and MALCOLM ALEXANDER WOODROW, both British subjects, both of Croydon Road, Elmers End, Beckenham, Kent, England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The present invention relates to a manhole cover and mounting frame assembly, which is suitable for use in a roadway.

Various types of manhole cover are known, in which the manhole cover is 15 circular, rectangular or square. These forms of manhole cover suffer from the disadvantage that if a stone or item of dirt becomes lodged underneath the cover, between the cover and the mounting frame, when a vehicle rides over the manhole, the manhole will tilt about an axis passing through the stone or piece of dirt, and cause an annoying rattling sound. In order 20 to overcome this problem, it has hitherto been proposed to construct a manhole in the form of a triangle, supporting elements on the mounting frame being so located relative to the edges of the triangular cover plate, that a straight line joining the outermost portion of any two of the supporting elements does not lie within the associated edge of the plate. Thus, the edge of the plate lies substantially over the line joining 30 the outermost portion of the supporting elements of the mounting frame, so that when the tyre of a vehicle first engages the plate, the tyre is inside or immediately over the axis about which the plate might be inclined to rock and rocking does not occur.

A disadvantage of a triangular plate, is that, in order for the plate to be sufficiently large to enable a man of normal stature to

pass through the manhole, the plate has to be of a very considerable size and therefore 45 is extremely heavy. Attempts have been made to overcome this difficulty by providing two right angled triangular plates, with their hypotenuses adjacent, so the square or rectangular plate, and therefore manhole, 50 may be obtained.

Such twin triangular plates have not proved very successful since they are difficult to lift without the use of special equipment.

A further construction includes six 55 equilateral triangular plates, arranged in a hexagonal array, with their apices supported at the centre on a cross-bar spanning the mounting frame. This construction is 60 cumbersome and also is difficult to lift without special equipment.

It is an object of the present invention to overcome the disadvantages of prior known manhole cover and mounting frame 65 assemblies.

According to the invention, there is provided a manhole cover and mounting frame assembly, in which the cover comprises a substantially triangular or trapezial 70 centre plate, having a base side and two sloping sides, and two substantially triangular or trapezial wing plates each also having a base side and two sloping sides, the base side of each wing plate being 75 loosely secured to a separate one of the sloping sides of the centre plate, to permit limited movement with respect thereto, the mounting frame having a boundary wall conforming to the periphery of the cover, 80 and the mounting frame having three supporting elements for each of the cover plates, such supporting elements all being located adjacent the boundary wall of the mounting frame, the straight line joining the 85 outermost portion of any two of the

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supporting elements for a given plate not lying within the associated side edge of such plate, the cover and frame being dimensioned so that the upper surface of the cover is substantially flush with the upper surface of the boundary wall.

In the assembly of the present invention, each of the three plates, which are loosely connected to one another, are mounted in the triangular manner and will not rock or rattle. The plates are secured loosely together for limited movement with respect to one another, so that if any dirt becomes lodged on a frame support element of one or more of the plates, it will not affect the location of the remaining plate or plates. Moreover, the whole assembly may readily be lifted as one unit.

In a preferred construction, the ends of the base side of the centre plate of the cover are provided with hinge lugs for co-operation with corresponding recesses in the mounting frame. The hinge lugs and recesses permit the plate to be hinged up, thus greatly reducing the effort required to lift the cover.

The base edges of the wing plate, and the sloping edges of the centre plate may be provided with downwardly extending webs, through which bolts or similar securing means pass loosely to secure the wing plate to the centre plate.

In order that the invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings in which:—

Figure 1 is a top plan view of one embodiment of manhole cover and mounting frame assembly according to the invention, the supporting element on the mounting frame being indicated in phantom;

Figure 2 is taken on the line II-II of Figure 1;

Figure 3 is an underneath plan view of the manhole cover of Figure 1; and

Figure 4 is a side elevation of the cover of Figure 3.

Referring now to the drawings, the assembly illustrated comprises a hexagonal cast iron mounting frame 10, having an upstanding boundary wall 11, which is provided on four of its edges with an outwardly projecting securing flange 12. As can be seen in Figure 2, the mounting frame is provided with rigidifying internal webs 13, 14 and 15.

The cover plate indicated by the reference numeral 16, consists of a substantially isosceles trapezial centre plate 17 and two substantially triangular wing plates 18. In the embodiment illustrated, the wing plates 18 have slightly chamfered corners where the base edge part 19 of each wing plate meets the sloping edges 20 and 21 thereof.

Each of the edges of each wing plate is provided with a downwardly extending web portion, the webs on edges 20 and 21 being cut away to provide a flat supporting ledge 22 in the vicinity of apex 23 of the wing plate 18. On the other hand, the base edge 19 of the wing plate 18, is provided with a bowed portion 24 extending downwardly.

Similarly, the sloping edges 25 and 26 of the trapezial centre plate 17, are provided with corresponding bowed portions which conform substantially to the shape of the bowed portions 24 of the wing plates. Bolts 27, 28 pass through the bowed portions 24, and the corresponding bowed portions on edges 25 and 26 of centre plate 17, to secure the wing plates to the centre plate. The nuts on the bolt 27, 28 are tightened to a degree which permits limited relative movement between the wing plates and the centre plate.

As can be seen from the Figures, the centre plate 17 has, at the end of its base edge 29 outwardly extending hinge lugs 30.

Turning now again to Figures 1 and 2, it will be seen that the mounting frame includes, adjacent its base end, two supporting elements 31, while two supporting elements 32 extend along the adjacent sides of the mounting frame. Similarly, at the far end, a further supporting element 33 is located, this extending across the full width of the far edge.

Further supporting elements 34 are located under the apex of each of the wing plates 18. Adjacent the base end, the mounting frame is provided with upstanding portions 35 extending upwardly from the supporting elements 31, and each provided with a recess 36 of a size to accommodate the hinge lugs 30 of the centre cover plate 17. As will be seen from Figures 1 and 3, the centre plate 13 is provided with two lifting apertures 37 and 38, and a lifting recess 39 is formed by cut away portions in the centre plate 17 and the boundary wall at the end remote from the base edge of the centre plate.

When the cover plate is located in the mounting frame, the lower portions 40 of the webs associated with the sloping edges 25 and 26 of the centre plate 17 rest upon the support element 31, while the far end of the centre plate has a surface 41 which rests on supporting element 33. Similarly the supporting elements 32, 33 and 34 support each of the wing plates 18 at three triangularly disposed points. Since each of the supporting elements is located at a position which is not within the perimeter of the associated plate, there will be no tendency for any of the plates to rock, should any dirt or stones become lodged between the plate and its associated supporting elements. When it is desired to lift the cover plate, a

key is inserted in the opening 38, and the whole assembly may be tilted by the centre plate hinging on the lugs 30 rotating in recesses 36. Alternatively, a further key 5 may be inserted in the opening 37 and the whole plate lifted out bodily.

WHAT WE CLAIM IS :—

1. A manhole cover and mounting frame assembly, in which the cover comprises a substantially triangular or trapezial centre plate, having a base side and two sloping sides, and two substantially triangular or trapezial wing plates each also having a base side and two sloping sides, the base side of each wing plate being loosely secured to a separate one of the sloping sides of the centre plate, to permit limited movement with respect thereto, the mounting frame having a boundary wall conforming to the periphery of the cover, and the mounting frame having three supporting elements for each of the cover plates, such supporting elements all being located adjacent the boundary wall of the mounting frame, the straight line joining the outermost portion of any two of the supporting elements for a given plate not lying within

the associated side edge of such plate, the cover and frame being dimensioned so that the upper surface of the cover is substantially flush with the upper surface of the boundary wall.

2. An assembly according to Claim 1, wherein the ends of the base side of the centre plate of the cover are provided with hinge lugs, for co-operation with corresponding recesses in the mounting frame.

3. An assembly according to Claim 1 or 2, wherein the base edges of the wing plates and the sloping edges of the centre plate are provided with downwardly extending webs, through which bolts or similar securing means pass, loosely to secure the wing plates to the centre plate.

4. A manhole cover and mounting frame assembly constructed and arranged substantially as hereinbefore described, with reference to and as illustrated in the accompanying drawings.

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the Original on a reduced scale.

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